

ABSTRACT

TITLE:"A STUDY OF ANATOMICAL PARAMETERS OF HUMAN CALCANEI IN FETUSES AND ADULTS"

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INTRODUCTION:

Formation of arches of foot plays a key role in bipedalism in human beings. Calcaneum is a unique tarsal bone participating in the arch formation. It has six surfaces facilitating attachment of muscles, ligaments and joint formation. There are individual and racial differences in the anatomical construction of calcaneum depending on the nature of articular facets and calcaneal grooves. The dysmorphologies of calcaneum due to congenital anomalies or fractures need medical or surgical management.

AIM AND OBJECTIVE:

The aim of our study was to find out, that each race has a unique pattern of calcaneum and the pattern of calcaneum was defined genetically. The detailed morphologic and morphometric observation would enlighten the knowledge of Anatomist, Radiologist and Orthopedic surgeons.

MATERIALS AND METHODS:

120 adult dry human calcanei of unknown gender without anomalies were studied. 30 calcanei of fetuses without gross anomalies were dissected out and observed. 100 x-ray images of ankle lateral view without any pathology were studied from the PACS in the institution, PSG IMS&R

In the dry bone study, the shape, position, pattern and numbers of articular facets were observed with naked eye. Thus the types of calcaneum were classified. The length breadth, height of calcaneum and length, breadth, height of interfacetal grooves were measured with the sliding digital Venire caliper. In the fetal bones, the shape of articular facets and the nature of interfacetal grooves were observed with hand lens and then they were classified as in adult pattern. In normal lateral view of x-ray images of ankle, the incidence of spur was observed. The Bohler's and Gissane's angle were measured with the help of special electronic on screen caliper tool.

OBSERVATION AND RESULT:

Out of the 120 dry calcaneal bones observed, 4 types of calcanei were identified except type 4 which was not found. Among these, Type 1 had the predominant incidence (68.33%) followed by Type 2 (26.67%) and Type 5 (0.83%) had the least incidence. While analyzing the subtypes, Type 1b (36.67%) had more incidence. In both anterior and middle articular facets, the oval shaped facets were predominant followed by the elongated facets. Whereas in posterior facets the circular shaped facets were predominant followed by rectangular facets. In analyzing the 30 fetal calcaneal bones, Type 1b calcanei had the highest incidence followed by Type 1a. When 100 images of lateral view of ankle radiographs were observed, the mean Bohler's angle was 30.49° and the mean Gissane's angle was 114.80° . The mean Bohler's angle had a significant difference while comparing the right female and left female samples with a P value of 0.047. The presence of spur was higher 32% on the left side than right side. The incidence of spur in female population was higher (34%) than the male population (24%). There was a gradual increase in incidence of

spur from 21 to 60 years. The highest incidence of spur was in the age group of 41 to 50 years and the least incidence was in less than 20 years of age. Both Achilles and plantar spur had the highest incidence (44.83%) and the least incidence was found in Achilles spur (12.07%).

CONCLUSION:

Type 1 calcanei had the highest incidence, both in adult and fetal bone study. The increased sustentacular angle and more surface area of Type 1 calcanei could favor easy gliding of articular facets and formation of unstable joint, resulting in early subtalar arthritis. So the podiatrists who treat this population could meet patients with more incidence of subtalar arthritis which is a common problem of Type 1 calcanei. The orthopedic surgeons' reconstructing the calcaneal derangements will be benefited by the detailed knowledge of calcaneal morphometry. The surgical techniques need modification while treating the Type 1 calcanei which is more common in Indian population in contrast to Type 2 calcanei present in European population. As calcaneal spur is one of the cofactor in the aetiologies of heel pain, the morphological and morphometric knowledge of spur observed in this study would help the podiatrist in planning the surgical or non-surgical line of treatment. The lower limit of Bohler's and Gissane's angle were comparatively less in our population than in international standards. The study of these angles in this population will help the Radiologist in, not reporting a false positive or negative calcaneal fracture. The angles of calcaneum play a key role while reconstructing the arches of foot in calcaneal fracture and also in assessing the prognosis of fracture management.

KEY WORDS: Calcaneum, Articular facets, Spur, Bohler's angle, Gissane's angle